

REMARKS

Claim 1 has been amended to incorporate the subject matter of claims 2, 3, and 6. Claims 2, 3, 6, 12, and 13 have been canceled without prejudice or disclaimer.

The previous rejections have been withdrawn, and the claims now stand rejected for alleged anticipation and obviousness based on newly cited prior art. The rejections are respectfully traversed, and their reconsideration and withdrawal are requested based on the amendments and the arguments presented below.

Claim Amendments

The amendments to claim 1 incorporate subject matter from previously pending claims 2, 3, and 6. In addition, the object of the method, which is to form a protective coating that is effective at a temperature above 1000°C even in the presence of a carbon oxidation catalyst or of moisture, has been added to the preamble. Further, claim 1 has been amended to state that the part is impregnated "in depth" with the impregnation solution. Support for the amendment is found, for example, at page 8, line 15, through page 9, line 7, where it is noted that the small grain size of TiB₂ powder is necessary to allow in-depth infiltration, and that the limited amount of TiB₂ in the composition is also

important to allow in-depth infiltration. No new matter has been added.

Claim 1 as amended contains the following limitations:

- a) the impregnation composition contains 20% to 70% by weight of metal phosphate(s), 5% to 50% TiB_2 , 20% to 50% water and 0% to 40% refractory solid filler other than TiB_2 ;
- b) TiB_2 is in powder form with a grain size lying in the range 0.1 μm to 200 μm ;
- c) the part is impregnated in depth with the impregnation composition, which means that the impregnation composition is brought to a certain depth below the surface of the part on which it is applied (see page 6, lines 7-11 of the specification).

It is noted that features a) and b) above are critical to obtaining the in depth impregnation of feature c).

Rejection Under 35 U.S.C. 102(b)

Claims 1 and 3-5 are rejected as allegedly anticipated by De Nora et al. (U.S. 6,228,424). De Nora discloses using an impregnation solution that is saturated with a treating agent but heated to remain in a liquid state. When it comes into contact

with the porous body to be protected, the cooling of the impregnation composition causes the treating agent to precipitate (see De Nora Abstract and at col. 2, lines 32-38 and 49-52). De Nora's field of use is the protection of components made of carbon in aluminium production cells, which in use are brought to temperatures below 1000°C (col. 5, lines 33-39). In one embodiment taught by De Nora, especially for aluminum production anodes, the treating liquid contains a boron compound capable of generating B₂O₃ (col. 5, lines 33-39). In another embodiment, preferred for protecting cell side walls, the treating liquid contains aluminium phosphate (col. 4, lines 11-16). Optionally, the treatment may be combined with the application of a suspension containing particles that block the surface pores of the body to form a surface coating (col. 4, lines 35-43). In particular for cathode blocks, the coating may be formed from particulate TiB₂.

In De Nora there is no disclosure of a composition containing both phosphate(s) and TiB₂, as required by the present claims. In addition, TiB₂ powder is used by De Nora not to impregnate the carbon body in depth, but to block the pores at the surface of the body. Thus, De Nora teaches a method that is inconsistent with the presently claimed use of an impregnation composition containing TiB₂ in powder form with a grain size in the range of

0.1 μm to 200 μm , a range selected to allow in depth impregnation. Further, De Nora does not disclose any particular amount of TiB₂ in the impregnation composition.

De Nora's teachings are further inconsistent with the presently claimed invention in that heating of the treating liquid as taught by De Nora favors reaction between any aluminum phosphate and TiB₂ present in the same treating composition. Such a reaction would cause the composition to gradually become less and less fluid, and hence less and less favorable to impregnation.

Therefore, due to the several distinctions discussed above, in particular the lack of simultaneous application of aluminum phosphate with TiB₂ and the formation of a surface protective layer rather than an in depth impregnation, De Nora does not teach every limitation of the present claims and does not anticipate the claims.

Rejections Under 35 U.S.C. 103(a)

Claim 6 is rejected as allegedly obvious over De Nora et al. (U.S. 6,228,424). De Nora is alleged to teach all elements of the claim except the weight percentages.

Even if the weight percentages could have been determined by routine optimization, several differences remain between De Nora's

method and the claimed method, as outlined for the previous rejection. In particular, De Nora does not teach the simultaneous application of aluminum phosphate and TiB₂, and indeed such a combination would have led to an undesired reaction under De Nora's heating conditions. Further, De Nora teaches the formation of a surface protective layer which is incompatible with the in depth impregnation required by the present claims, as the initially formed surface layer would have prevented in depth impregnation. Therefore, De Nora does not teach every limitation of the present claims and does not render the claims obvious.

Claims 2, 7, 8, 12, and 13 are rejected as allegedly obvious over De Nora (U.S. 6,228,424) in view of Morel (U.S. 5,420,084). As a threshold matter, it is noted that claims 2, 12, and 13 have been cancelled. Since De Nora does not teach the size range of 0.1 to 200 μm for TiB₂ particles, Morel is added for its teaching of 10-40 μm ZrB₂ particles.

The deficiencies of De Nora have been discussed above. Alone because De Nora fails to teach or suggest using aluminum phosphate and TiB₂ in the same solution, or performing in depth impregnation, the rejection fails.

Further, as already pointed out in response to the previous Office Action, Morel teaches away from using TiB₂ as being

improper to form a protective coating which remains efficient over 1000°C (Morel at col. 2, lines 55-59). The clear teaching of Morel is to use a mixture of ZrB₂ and colloidal silica, which forms the central feature of Morel's invention (col. 4, lines 6-9). Indeed, starting from De Nora, applying the teaching of Morel to increase the temperature at which the protective coating would be efficient would necessarily lead to using ZrB₂ in powder form.

Therefore, for the reasons discussed above, the present claims are not obvious and the rejection should be withdrawn.

Application No. 10/566,067
Filed: January 26, 2006
TC Art Unit: 1712
Confirmation No.: 2032

The Examiner is encouraged to telephone the undersigned attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

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Dated: July 13, 2010

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